Sacher Lasertechnik Group

Wavelength Locker Unit - Top Of Line Stabilization

Operation and Maintenance Manual

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Duration and conditions of warranty for this product may be superceded when the product is integrated into (becomes a part of) other Sacher Sacher Lasertechnik[Group] products. During the warranty period, Sacher Lasertechnik[Group] will, at its option, either repair or replace products which prove to be defective.
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General Information

Introduction

This manual describes the features and specifications of the Wavelength Locker Model 5302WL instrument. The Wavelength Locker is design to stabilize the wavelength output of an external cavity laser diode system. The Wavelength Locker is compatible with both Littrow and Littman-Metcalf configured external cavity systems. The frequency locking detection device can be either a reference cell or temperature controller etalon. The Wavelength Locker instrument is supplied with an external power supply.

Figure 1 - Model 5302WL Wavelength Locker

Theory of Operation

The Wavelength Locker (5302WL) is design to stabilize the output wavelength of an External Cavity Laser Diode System by using either a dither lock or a sidelock mechanism. The dither locking mechanism uses a modulator-demodulator combination for centering the External Cavity output on the peak of a reference feature. The sidelock mechanism provides an un-modulated operation for locking the laser's wavelength along the side of the reference feature. Figure 2 is a block diagram of the Wavelength Locker system. The figure is followed by a description of Wavelength Locker internal circuitry.

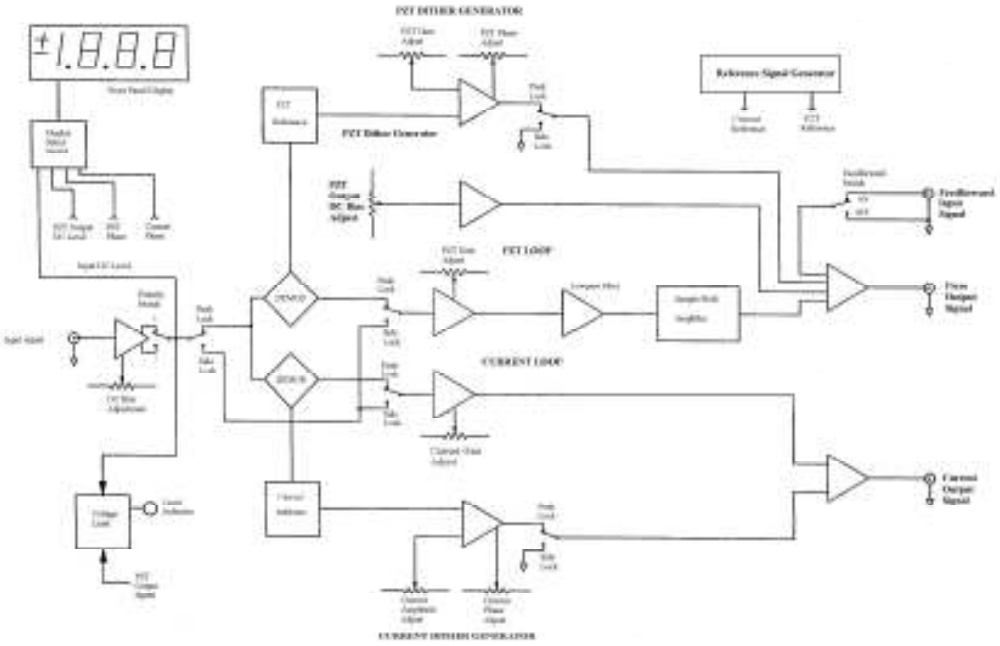


Figure 2 - Model 5302WL Block Diagram

Input Signal

The input signal to the 5302WL is generated from external photo-detector. The photo-detector circuitry converts the optical signal from a reference cell or temperature controlled etalon to an electrical signal for the Locker. The photo-detector amplifier output is connected to the Locker's Input Amplifier by the front panel "Input" connector. The Input Amplifier filters and amplifies the input signal. The output of the Input Amplifier is directed to the Meter Rotary Switch, allowing the DC component of the Input Amplifier output to be displayed on the Front Panel Display. The Zero Adjust potentiometer on the front panel is used to null the Input Amplifier output. The Input Amplifier output is also directed to the overload detector, which will illuminate a front panel OVR LED if the output of the input amplifier exceeds the allowable +/- 10volt limits. The sum of the peak input voltage plus the offset voltage must not exceed +/- 10 volts. The phase and polarity of the Input Amplifier output may be reversed with the "+/-" Switch. This switch is usually used to obtain an overall negative feedback in the control loop. Both the DC bias and the signal are reversed simultaneously with the front panel Polarity (+/-) switch.

Dither/Sidelock Mode

The output of the Polarity switch is routed through the "Dither/Sidelock" Selector Switch. In the Sidelock mode, the switch bypasses the demodulators and precludes the application of the modulating (dither) signals to the PZT and current output drivers while in the sidelock mode. There is only a gain adjustment provided in the sidelock mode. In the Dither mode, the modulating (dither) signals are routed to the PZT and current output drivers. The output signal from an external photodetetor is applied to the individual demodulators for PZT and Current loops.

Gain Amplifier

After the demodulator, there is a gain amplifier for PZT and current respectively. The gain amplifier has an output gain that varies between zero and ten. The variable gain amplifier is set from the Locker front panel. Each of the amplifier's gain is controlled from the PZT Gain or Current Gain potentiometer respectively. The PZT and Current Gain potentiometers should be rotated counterclockwise to there "OFF" positions. The "OFF position of the Gain potentiometers indicate a gain of zero.

Output Stage and Driver

In both channels, there are output-summing amplifiers. In the Current channel, there are two inputs to the summing amplifier, the signal from the gain amplifier output and modulation (Dither) signal. The PZT channel also has gain amplifier and modulation (Dither) signals to the summing amplifier, but also has a DC offset voltage from the front panel Output Bias potentiometer and an external "Feed-Forward" voltage from the "Feed-Forward" BNC connector. The output voltage of the PZT summing amplifier is monitored by the meter via the meter selector switch and by the Overload Detector circuit. The front panel OVL lamp will illuminate if the PZT summing amplifier output exceeds the allowable +/- 10volt limits.

Dither Signals

The Wavelength Locker generates two dither signals: PZT and Current. The PZT dither frequency is 800 hertz. There are two Wavelength Locker versions of current dither frequencies; 1MHertz and 100KHertz. The dither signal amplitude and phase are adjusted by two concentric potentiometers on the Locker front panel. The Amplitude and Phase (ϕ) potentiometers set the amplitude and phase for each of the dither signals. The outside potentiometer controls the amplitude and the inner potentiometer is used for the phase adjustment. The dither amplitude is adjustable between zero and a maximum of 100millivolts peak to peak for the PZT channel and between zero and 3volt peak to peak for the current channel. The phase potentiometer sets the phase relationship between the internal reference signal and input signal over a +/-180 degrees range. The Front Panel display via the meter selector switch monitors the phase for the PZT and current dither signals.

Product Features

- Flexible User Interface
- Dual Frequency Peak Locking using both PZT and Current
- Compatible with External Cavity Tunable Diode System
- (not purchased features may not be installed)

Safety Terms and Symbols

The following safety terms are used in this manual:

- The WARNING heading in this manual explains dangers that could result in personal injury or death.
- The CAUTION heading in this manual explains hazards that could damage the instrument.
- In addition, a NOTES heading gives information to the user that may be beneficial when using this instrument.

General Warnings and Cautions

The following general warning and cautions are applicable to this instrument:

CAUTION

Although ESD protection is designed into the 5302WL, operation in a static-fee work area is required. The External Cavity Laser Systems used in conjunction with this product contains a laser diode.

WARNING

There are no serviceable parts inside the Model 5302WL. Work performed by persons not authorized by Triad Technology Inc. will void the warranty. For instructions on obtaining warranty repair or service please refer to Chapter 3 of this manual.

System Operation

Introduction

This section of the manual provides the operational instruction for the 5302WL Wavelength Locker Module. The user should read this manual carefully before attempting to use this instrument. Only purchased features will be installed.

WARNING

This instrument is intended for use by qualified personnel who recognize shock hazards or laser hazards and are familiar with safety precautions required to avoid possible injury. Read the instruction manual thoroughly before using, to become familiar with the instrument's operations and capabilities.

Model 5302 Front Panel

The Wavelength Locker front panel controls are designed to make it a highly flexible accessory to an External Cavity Tunable Laser System. The controls mounted on the front panel are indirect, that is, the actual signals are not routed back and forth between the circuit card and the front panel. Control signals are sent from the mechanical switches and potentiometers on the front panel.
Described below are the functions of each of the controls for the Model 5302WL front panel.

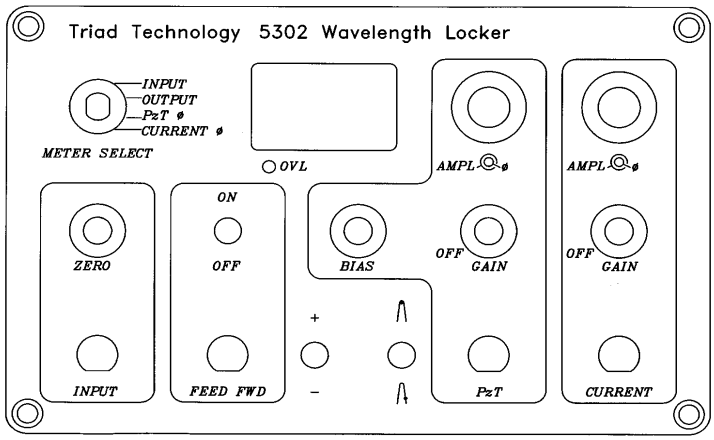


Figure 3 - Model 5302WL Front Panel

1. Potentiometers

PZT Channel Gain:	Adjustable from zero to ten.
Current Channel Gain:	Adjustable from zero to ten.
PZT Dither Amplitude:	Adjustable from zero to 100 millivolts peak to peak
PZT Dither Phase:	Adjustable from zero to +/- 180 degrees.
Current Dither Amplitude:	Adjustable from zero to 3 volt peak to peak.
Current Dither Phase:	Adjustable from zero to +/- 180 degrees
Input Zero Adjust:	Offsets Photodetector signal by up to +/- 10 VDC
Output Bias Control:	Offsets output signal by up to +/- 10 VDC.

2. Switches

Dither/Sidelock:	*Switch for setting the mode to either peak lock or sidelock operation.*
Polarity:	*The polarity reversal switch changes the polarity of the input signal by 180 degrees. Note that the input bias reverses along with the signal. The bias voltage may be varied from full scale positive to full scale negative.*
Feedforward:	*This switch allows an external signal source to be added to the PZT output signal. In the OFF position, the switch simply grounds the unused input to the output amplifier when Feedforward is not used.*
Meter Select:	*This switch selects one of four measurements to display on front panel.*

3. Connectors

Input Signal:	*Input signal from an external peak detection circuitry.*
PZT Output:	*Connects to the PZT modulation input of the laser system.*
Current Output:	*Connects to the Current modulation input of the laser system.*
Feedforward Input:	*An external signal used to modulate the PZT via the front panel Feedforward BNC connector.*

4. Display/Indicator

Meter: *The digital panel meter displays the DC level of the input error signal, the DC output level of the PZT output, the PZT dither phase or the Current dither phase.*

Overload Indicators: *If the output of the input amplifier or the PZT output amplifier exceeds allowable limits, the indicators will illuminate. It will extinguish when the voltage overload is gone.*

Model 5302WL Rear Panel

The Wavelength Locker controls are designed to make the unit a highly flexible accessory to an External Cavity Tunable Laser System. The controls mounted on the front panel are indirect, that is, the actual signals are not routed back and forth between the circuit card and the front panel. Control signals are sent from the mechanical switches and potentiometers on the front panel.

Described below are the functions of each of the controls and outputs for the Model 5302WL rear panel.

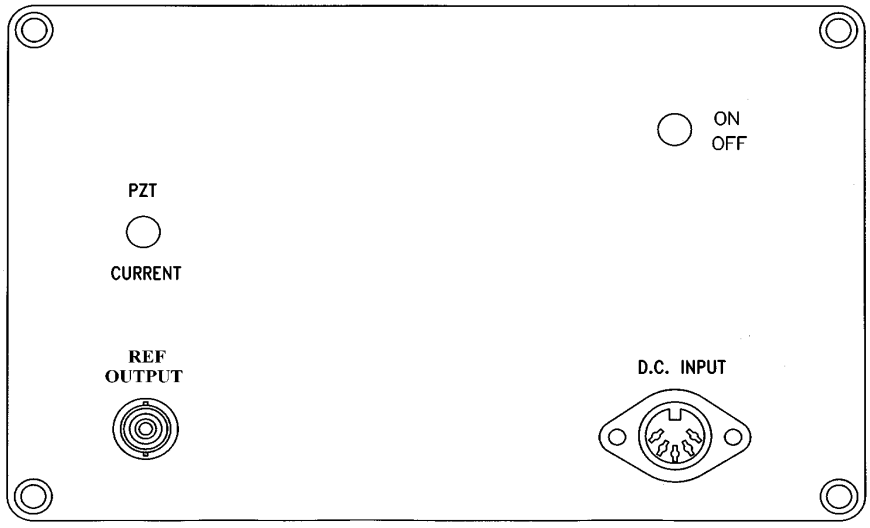


Figure 4 – Model 5302WL Rear Panel

1) Switches

Power: *Power switch for turning the unit Off and On.*

Ref Select: *Select either PZT or current reference output.*

2) Connectors

Ref Output: *Wavelength Locker internal frequency reference signal (TTL compatible output).*

DC Input: *Power input connection for the Wavelength Locker.*

General Operation

Please read and understand through this general operation example at least one time before following the steps. This will make your start much easier!!

The Wavelength Locker does not require any warm up time. The 5302WL control signals are applied to both the piezoelectric actuator (PZT) in the external cavity tuning mechanism for DC and low frequencies and laser diode current driver for higher frequencies for rapid high frequency disturbances. The PZT servo channel will be effective from DC to about 800Hz hertz, while the current servo channel will be effective from about 800Hz hertz to 1 MHz or 100Khertz dependent on the Wavelength Locker model. The PZT and current channel together form a control loop with a response over the range of both control loops.

Input Power Connector

The Wavelength Locker is supplied with an external power supply. The external supply is compact in size and is supplied with a universal input capable of an input voltage range from 90 to 260volts. The power supply is connected to the Wavelength Locker thru a five (5) pin DIN connector. The AC input connector is an IEC320 C13 connector. The user can order the 5302Wl Wavelength Locker with a different power cords.

CAUTION

DO NOT exceed 260 VAC on the line input.

Do not operate with a line voltage that is not within ±10% of the line setting. Too low of an input voltage may cause excessive ripple on the DC supplies. Too high of an input voltage will cause excessive heating.

WARNING

To avoid electrical shock hazard, connect the instrument to properly earth-grounded, 3-prong receptacles only. Failure to observe this precaution can result in severe injury or death.

Warm Up and Environmental Consideration

The 5302WL Wavelength Locker does not have a warm up and can be used immediately after being powered on. The External Cavity laser system may have a warm up time. To achieve best performance, allow the recommended warm up for External Cavity Laser system as described in the User's Manual for your laser. Allowing for the laser system warm up will make for a more stable frequency lock. Consult the laser system's user manual to determine the proper warm up time.

Wavelength Locker Initial Setup

With the 5302WL connected to its power supply, push the power switch to supply power to the Locker. The front panel display will light up.

1. Initial 5302WL settings are as follows;
   - **a.** Turn amplitude counterclockwise to the "OFF" position for both the PZT and CURRENT. Switch meter select to PZT ϕ using the PZT "ϕ" potentiometer adjust for zero phase. Switch meter select to CURRENT ϕ using the current "ϕ" potentiometer adjust for zero phase.
   - **b.** Switch the meter select to "OUTPUT", adjust to zero voltage using the BIAS adjust potentiometer. Turn off the GAIN on both PZT and CURRENT. Switch the "FEEDFORWARD" to "OFF" position. Set the 5302WL to "Peak Lock" and "+"polarity. Set to "-"polarity may be needed in case the absorption is inverted by the balanced receiver. Switch the meter select to "INPUT", adjust to zero voltage using the ZERO adjust potentiometer

2. Frequency Generator setting are as follows;
   - **c.** Frequency adjust 50Hz or 100Hz and amplitude and amplitude adjusted to 1 volt peak to peak. The output signal should be set to a ramp with 50% duty cycle with zero DC offset if possible (not needed if the PI-1000-RG with external ramp access is purchased). Adjust the oscilloscope to get the ramp to extend the across the display with zero volts in the middle of the screen.
   - **d.** Connect the output of the Function Generator "OUTPUT" to the Oscilloscope 'TRIGGER" input and 5302WL "FEEDFORWARD" input.

3. Set up Lockbox per Figure 5 to the following;

e. Connect the PZT and CURRENT outputs of the 5302WL to External Cavity Laser PZT (PI-1000-PZ) and CURRENT (PI-1000-MD) modulation inputs if purchased, or use equivalent equipment.

f. On optical table align cavity output so that pass thru reference cell or temperature controller. Insert beam splitter or neutral density filter between laser output beam and cell. If a neutral density filter is used adjust so that the laser power going thru the cell is less than 1mW. Align the photodetector so that the laser beam is positioned at the center of the detectors active region. The detector/ transimpedance amplifier output is connected to the input of the lockbox and oscilloscope "Channel A". Adjust the neutral density filter so that the transimpedance amp is not saturated. Also refer to the User's Manual of the RB-Setup if purchased and the references therein.

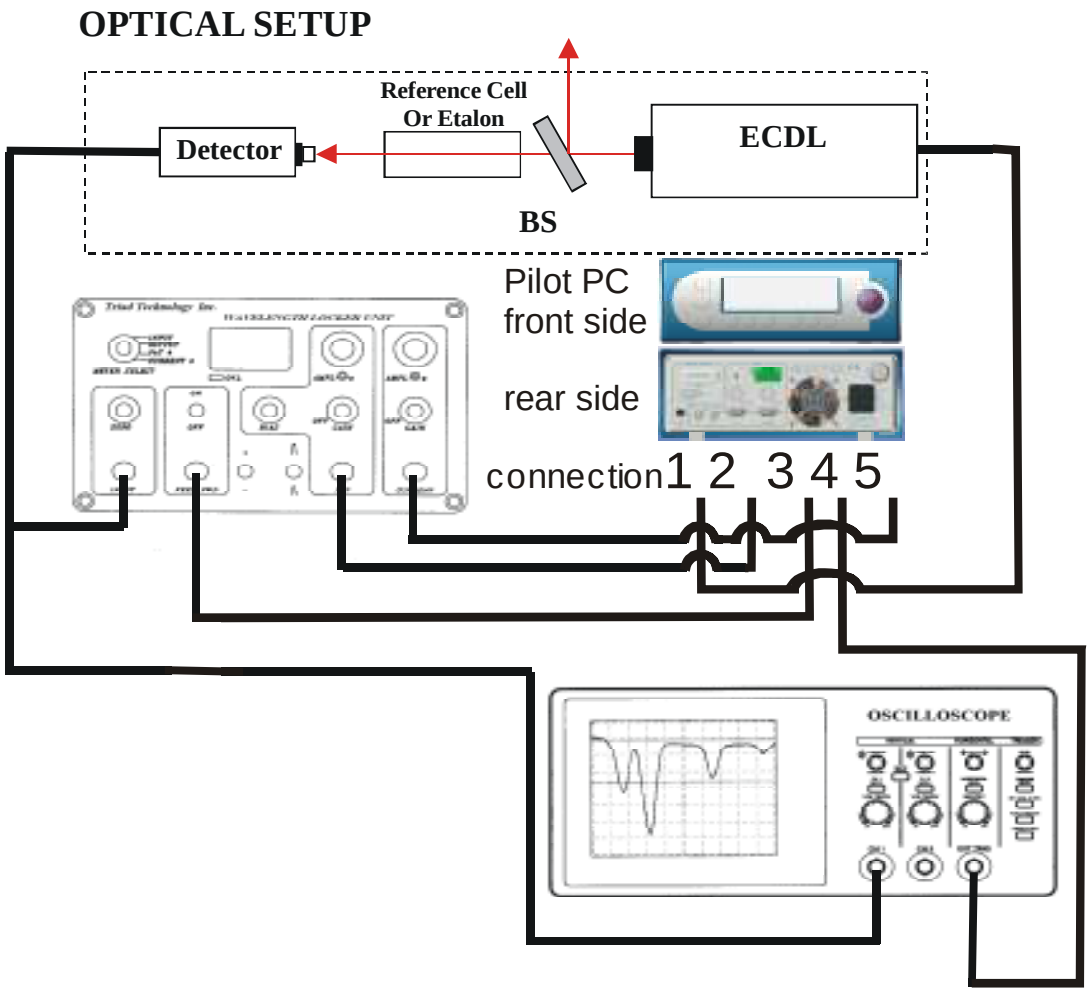


Figure 5 – External Cavity Wavelength Locking Setup

Connection No	Cable Description	Connect to Pilot PC
1	Laser and TEC cable	Laser and TEC connector
2	Piezo Output	PZ MOD IN connector***1**
3	Feedforward	not required
4	Trigger Signal	Piezo out
5	Current Output	MOD IN

Table 1 – Optical Setup Connection Table

*1: If there is no oscilloscope connected to the “Piezo out” a ground connection from the piezo Output to the ground is necessary.
Note: This setup is realized with the Sacher-Lasertechnik PILOT PC laserdriver with a piezo option. If you get a PILOT PC laserdriver from us, the piezo option will be installed, so that you can plug the BNC to the 5302WL directly.

Peak Lock Procedure

The following example involves locking the output of a 780nm External Cavity laser to a natural Rubidium reference cell. The wavelength of the External Cavity laser needs to be set to 780.2nm. The External Cavity User Manual will provide instruction for setting the output wavelength. If purchased, the Rb-Setup User's Manual will provide further details.

4. Set up the oscilloscope to display the photodetector signal on Channel A and Frequency generator ramp output on Channel B. Adjust the Frequency Generator so that positive edge of the ramp is approximately the length of the oscilloscope display. On the Wavelength Locker, switch the "Feedforward" switch to "On". On oscilloscope you should see the absorption feature. If you do not see the desired peak, adjust the External cavity PZT voltage until the peak is displayed on the oscilloscope display. Adjust the PZT voltage until you see the absorption centered of the oscilloscope display. The oscilloscope measures the DC level of the desired peak. Figure 6 shows the absorption feature of a natural Rubidium cell and the signal generator ramp are displayed. Note the DC voltage level at the bottom of the absorption peak. You may also use AC if DC is not possible. In this case use the fluorescence of the hyperfine lines to detect the desired peak you want to lock at. Also the PZT ramp may be chosen smaller if you use the smaller Doppler free signals or equivalent small peaks.

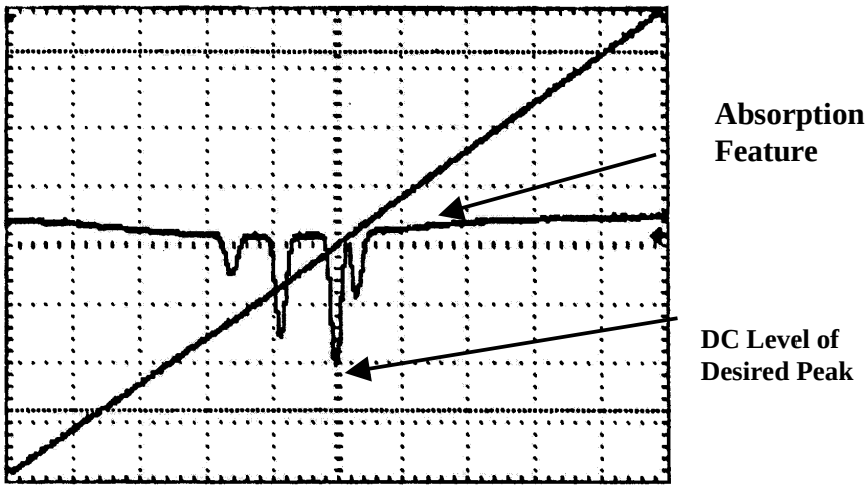


Figure 6 – Rb Absorption Feature

Note:
A figure of a Doppler-free saturated absorption feature is shown in Fig. 16 in the Appendix.

5. On the Wavelength Locker, turn off the "Feedforward" switch. Using the PZT adjust of the External Cavity Laser; adjust the PZT voltage until the oscilloscope level is at the level of the bottom of the absorption peak or desired hyperfine peak. With the detector output at the bottom of the peak, switch the meter select on the Wavelength Locker to "Input". Use the "Zero" to adjust the photodetector DC level to approximately zero. Note the voltage reading of the Locker display. Any change in the input DC level will indicate that the system has drifted off or to the side of the absorption peak. Note the input display DC level if possible.

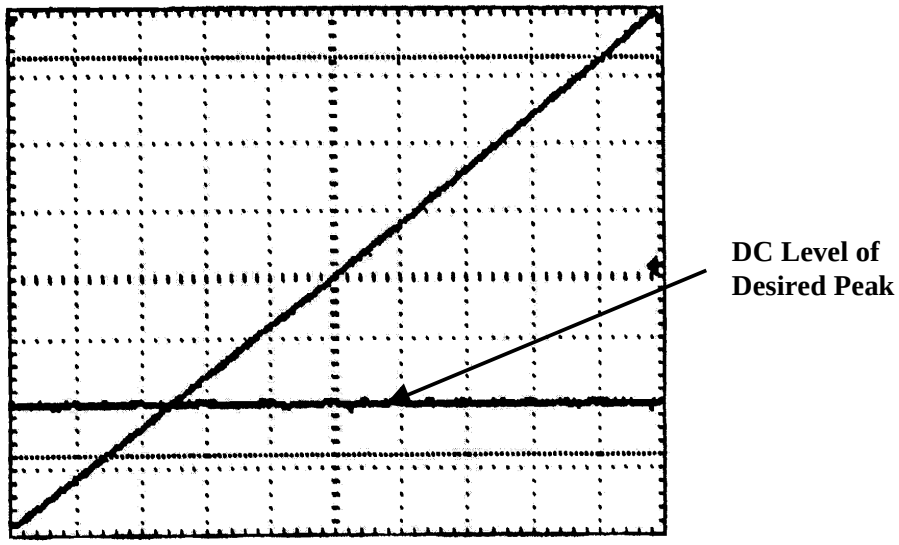


Figure 7 – Absorption Peak DC Level

6. The next step is to adjust the Wavelength Locker phase. The PZT and Current phase needs to be adjusted before attempt to lock the External Cavity output. It is important to adjust the phase of both dither signals looking at the photodetector signal at the bottom of the absorption peak. The PZT and Current reference signal are located in the rear of the Wavelength locker. Connect the Reference Signal output to the oscilloscope Channel B input. On the oscilloscope change the trigger to Channel B. The Ref. Select switch in the rear of the Locker determines which reference signal is applied to the Reference Signal output. Switch the Ref Select switch to "PZT". On the Wavelength Locker, turn up the amplitude of the PZT dither signal. The dither signal will appear on the photodetector signal. The PZT dither signal will be in synch with the reference signal. You may need to tune the PZT of the ECDL a little to find the desired line. At the absorption peak, the photodetector signal will be a 2 times the dither signal. If the photodetector signal is not at 2f of the dither, adjust the Bias on the Wavelength Locker. (Fig A2 in the appendix shows the Doppler - free equivalent). The Locker display should be reading zero for the input DC level when the system is at the absorption peak. As you adjust the PZT phase (ϕ), the photodetector signal moves in phase compared to the reference signal. The phase is adjusted properly when photodetector signal forms an "S" curve is center of the positive half of the reference signal. With the PZT phase properly adjusted, change the Wavelength Locker meter select to PZT ϕ, read the phase value. Turn the PZT dither signal amplitude back to zero. Change the Wavelength Locker meter select to "Input". The Locker display should read zero. Figure 8 shows the proper phase relationship between the reference output and photodetector signal

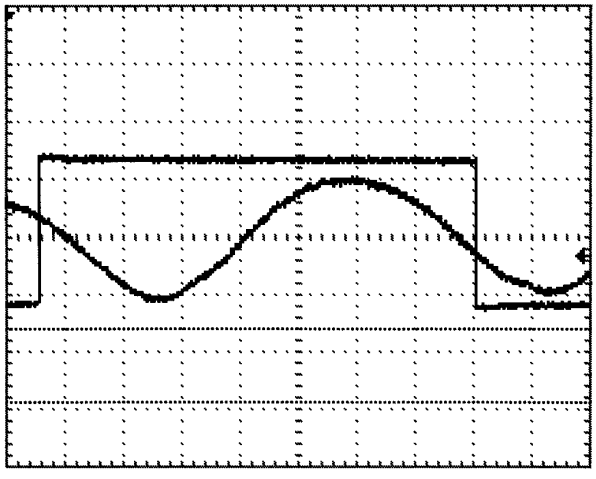


Figure 8 – PZT Phase Adjust

Note:
Fig 18 in the appendix shows the Doppler -free equivalent.

7. After adjusting the PZT phase, the Current phase is adjusted next. Switch the Ref. Select switch in the rear of the Locker to "Current". On the Wavelength Locker, turn up the amplitude of the Current dither signal. The dither signal will appear on the photodetector signal. The Current dither signal will be in synch with the reference signal. At the absorption peak, the photodetector signal will be a 2 times the dither signal. If the photodetector signal is not at 2f of the dither, adjust the Bias on the Wavelength Locker. The Locker display should be reading zero for the input DC level when the system is at the absorption peak. As you adjust the Current phase (ϕ), the photodetector signal moves in phase compared to the reference signal. The phase is adjusted properly when photodetector signal forms an "S" curve is center of the positive half of the reference signal. With the Current phase properly adjusted, change the Wavelength Locker meter select to Current ϕ, read the phase value. Turn the Current dither signal amplitude back to zero. Figure 9 shows the proper phase relationship between the reference output and photodetector signal

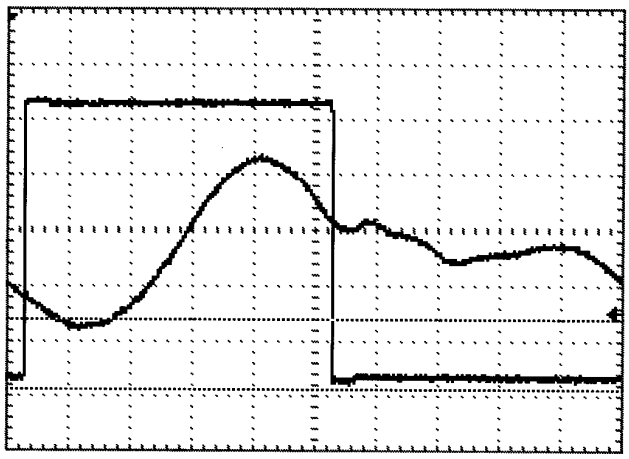


Figure 9 – Current Phase Adjust

PZT Lock Procedure

The PZT is locked to the absorption peak first. Switch the Ref Select switch back to "PZT" and trigger on this signal again. Turn up the amplitude of the PZT dither signal until the signal is present on the photodetector output. Different levels of the absorption feature can be identified by adjusting the PZT DC voltage of the External Cavity Laser or by using the 'Bias" and observing the amplitude of the PZT dither signal. At the base of the absorption feature, the dither signal is a relatively small in amplitude. The feature baseline will not have much of a slope. As the PZT voltage is adjusted along the side of the absorption peak, the amplitude of the dither signal will increase dependent on the slope of the peak's side. At the bottom of the absorption feature, the photodetector output will decrease in amplitude, but the frequency will be double the dither signal frequency. Figure 10 illustrated the change in PZT dither signal as the laser output transverses the absorption feature.

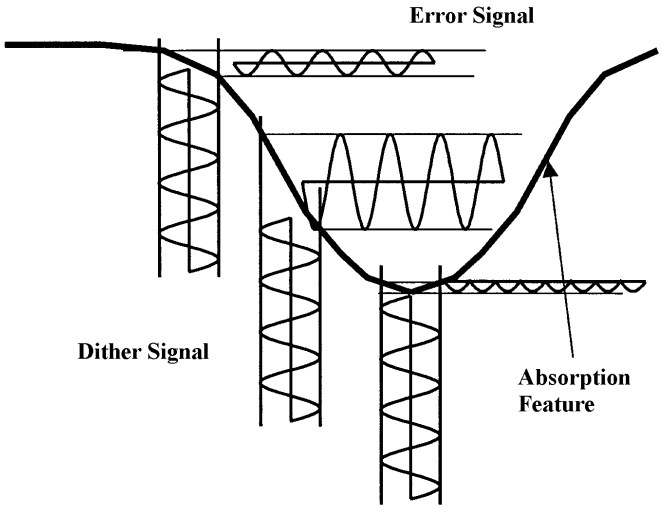


Figure 10 – PZT Modulation Signal along Absorption Peak

8. On the Wavelength Locker, turn the PZT amplitude adjust to about 1/3 of it full range. The PZT dither signal will appear on the oscilloscope photodetector signal. Figure 11 shows the photodetector dither signal along the side of the absorption peak.

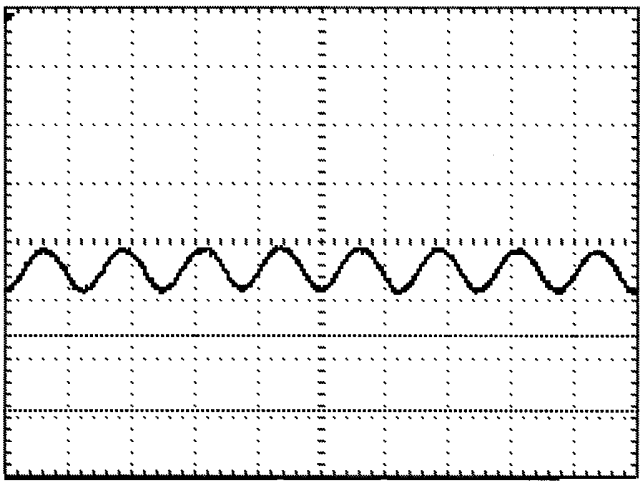


Figure 11 – PZT Modulation Signal on the side of the Absorption Peak

9. Adjust the Bias knob until the meter display reads the absorption peak DC level. The oscilloscope's sine wave will be twice the PZT dither frequency. Figure 12 shows the photodetector dither signal along the bottom of the absorption peak. Start increasing the Wavelength Locker PZT gain potentiometer. As the gain is increased, the amplitude of the photodetector sine wave will decrease slightly and produce 2F photodetector signal. The photodetector signal will start to oscillate when there is too much gain. Turn down the gain until a stable signal is achieved. Fig 12 shows PZT modulation with 2f at bottom of absorption peak. Small changes of the PZT on the laserdriver of the ECDL will not result in a wavelength change anymore, which means the laser is locked: please carefully check. In case the laser is not locked, the polarity switch may be in the wrong position.

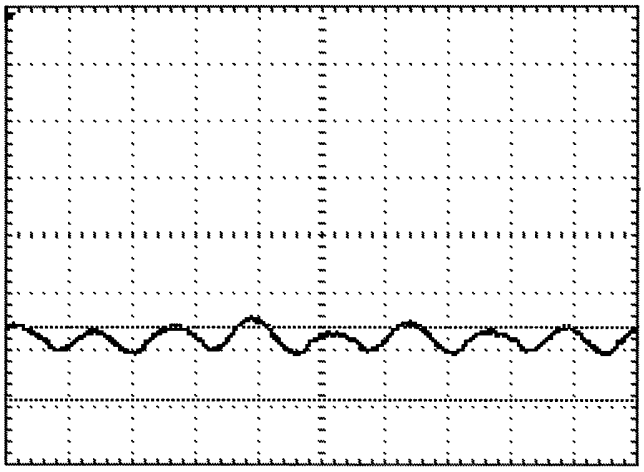


Figure 12 – PZT Modulation Signal at the bottom of the Absorption Peak

Optionally Current Lock Instructions

The current lcok may be purchased optionally and is normally not installed or tested.
With the PZT loop locked, the Current loop will need to be adjusted for locking. The current locking mechanism at the absorption peak is accomplished when the current dither signal and the photodetector signal are brought in phase. When the current dither is applied to the photodetector, a beat frequency is present. The beat frequency is produced by the phase difference between the internal reference frequency and the dither signal at the photodetector. The beat frequency approaches DC as photodetector signal frequency approaches the Wavelength Locker internal reference frequency. Adjusting the gain to minimize the beat frequency locks the current loop. Figure 13 illustrates the current locking mechanism.

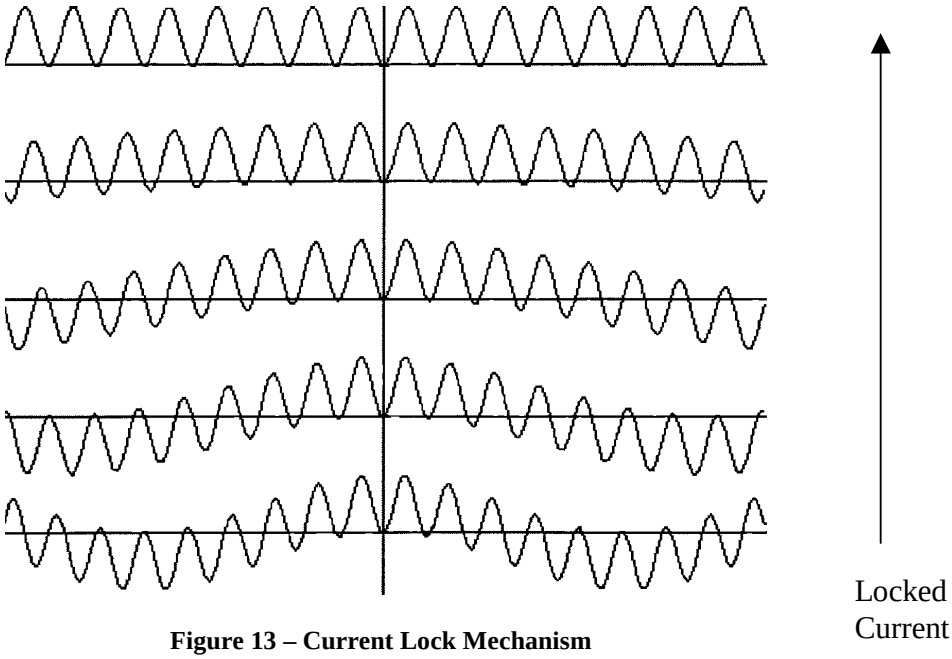


Figure 13 – Current Lock Mechanism

10. Turn up the Current dither amplitude until the dither signal appears on the photodetector signal. Figure 14 shows the photodetector signal with the current dither amplitude increased.

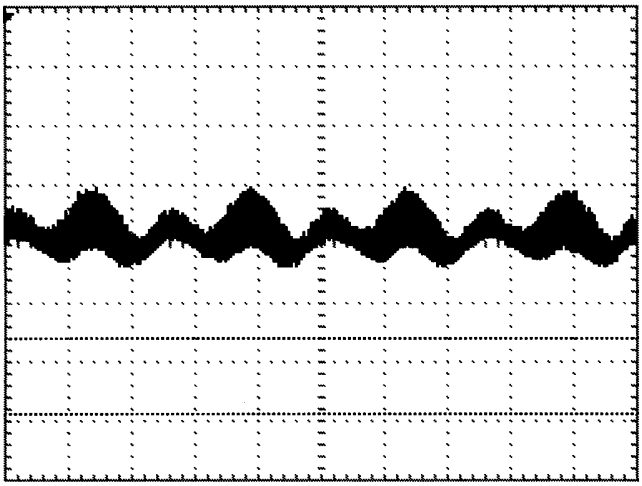


Figure 14 – Current Modulation Signal

11. Start increasing the Wavelength Locker current gain potentiometer. As the gain is increased, the amplitude of the photodetector sine wave will decrease and become try to become flat. The photodetector signal will start to oscillate when there is too much gain. Turn down the gain until a stable signal is achieved. To optimize either of the loops, you can decrease the amplitude and increase the gain until you have the loop locked with the minimum input voltage swing. Fig 15 shows final Current lock.

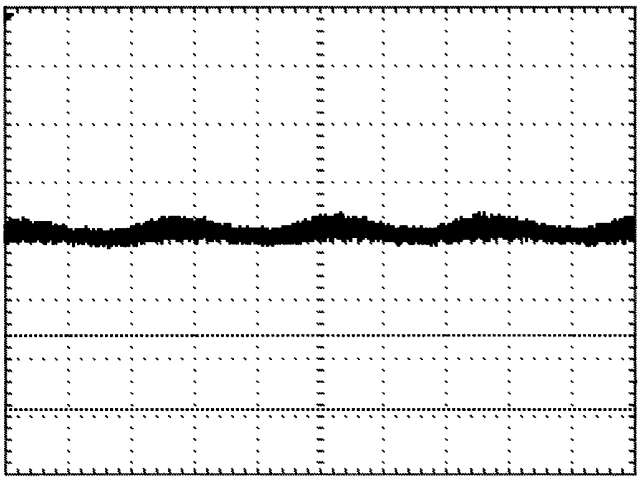


Figure 15 – Current Locked to Absorption Feature

Note:
Fig A4 in the appendix shows the Doppler -free equivalent.

Sidelock Procedure

The sidelock procedure may not be installed if not purchased.

The sidelock allows the laser to be locked on either side of an atomic or molecular absorption line or an etalon transmission line. The method of locking to the side of a transition is to define a point on the side of the transition that will give a zero volt error signal. If the frequency of the laser deviates from the set point the resulting error signal sign is such that it pushes the laser frequency back to the set point.

Setup the Wavelength Locker as shown in Fig 5 with the CURRENT and PZT GAIN in the off position.

1. The signal generator going into the FEED FWD should be a 50 Hz sine wave to produce the cleanest features. Use dc coupling on the oscilloscope and trigger off the pulsed output of the frequency generator. Gradually decrease the amplitude from the signal generator and adjust the PZT voltage on the External Cavity laser until only the line observable is the feature to lock onto. Record the peak to peak voltage of the full feature and the voltage of the lock point on the oscilloscope.

2. Turn off the FEED FWD and use the Wavelength Locker BIAS potentiometer to locate the desired lock point by noting the dc voltage on the oscilloscope.

3. Switch the panel meter to input and adjust the INPUT ZERO so that the meter reads 00.0 when the dc level of the signal on the oscilloscope is near the desired lock point.

4. Gradually turn up the gain while watching the signal on the oscilloscope. If the lock point moves away from the desired dc level then compensate by changing the PZT BIAS.

5. Turn the PZT GAIN slowly up until the loop begins to oscillate, and then turn the gain lower to establish the gain needed for stable operation.

6. The position of the lock point may be finely adjusted by changing the PZT BIAS. Turning the PZT GAIN to the off position may lock onto the other side of an absorption feature. The polarity (+/-) switch is changed to opposite position. Then find the lock point by adjusting the PZT BIAS and slowly turn up the gain as described in step 4.

7. After the PZT lock is stabilized, the current lock gain may be increased to reduce the frequency noise of the laser over a greater

bandwidth. Turn the gain up slowly until the loop starts to oscillate. Then back off the gain so the loop is stable. Reducing the frequency noise of the laser through current feedback will correspondingly increase the amplitude noise of the laser.

Note: If the current loop does not reduce the high frequency noise then the polarity of the current loop relative to the PZT loop will need to be reversed. The unit is preset at the factory. Please contact Triad Technology concerning information for modifications to your Wavelength Locker unit.

Ordering Information

Wavelength Locker Model 5302WL

Model	Description
TT-5302WL-1M-US	Wavelength Locker with US compatible AC power cord.
TT-5302WL-1M-AS	Wavelength Locker with Asian compatible AC power cord.
TT-5302WL-1M-EU	Wavelength Locker with European compatible AC power cord.
TT-5302WL-100K-US	Wavelength Locker with US compatible AC power cord.
TT-5302WL-100K-AS	Wavelength Locker with Asian compatible AC power cord.
TT-5302WL-100K-EU	Wavelength Locker with European compatible AC power cord.

Table 2 – Part Number for Model 5302WL

Specifications

Wavelength Locker Model 5302WL Specifications

Model 5302WL Specifications

Input Signal Range	.1 to 10volts
Input Signal Zero	± 10volts
PZT Dither Frequency Current Dither Frequency	800Hertz Model 1M: 1MHertz Model 1K: 1KHertz
PZT Amplitude Adjust Current Amplitude Adjust	0 to 100millivolts peak to peak 0 to 3volts peak to peak
PZT Phase Adjust Current Phase Adjust	± 180 degrees ± 180 degrees
PZT Output Bias Adjust	± 10volts
Power Requirements	See Table 2: Power Supply Specifications
Weight	0.75 Lbs (1.65 Kg)
Size (H x W x D)	3.5 in. x 8.5 in. x 11 in. (88 mm x 215 mm x 280 mm)
Operating Temperature	5 to 40℃, < 90% relative humidity non-condensing
Storage Temperature	-20℃ to 60℃, < 90% relative humidity non-condensing

Table 3 – Wavelength Locker Specifications

Power Supply Specifications

AC Voltage Range	90 – 264 VAC
AC Input Frequency	47 – 63 Hz
DC Output Voltage	+ 5VDC at 3.0 Amps, +15VDC at 1.6A, -15VDC at 0.3Amps
DC Output Connector	DIN Female 5 Pin 180°

Table 4 – Power Supply Specifications

NOTE: In accordance with ongoing efforts to continuously improve our products, Triad Technology Inc. reserves the right to modify product specifications without notice and without liability for such changes.

Factory Service

Introduction

This section contains information regarding obtaining factory service for the Model 5302Wl. The user should not attempt any maintenance or service of this instrument and/or accessories. Contact Triad Technology for assistance.

Obtaining Service

To obtain information concerning factory service, contact

Sacher Lasertechnik[Group]
Hannah – Arendt Str. 3 – 7
35037 Marburg, Germany
Tel: +49 6421 305 – 0, Fax: +49 6421 305 - 299
Contact@sacher-laser.com

or

Triad Technology at (720) 494-0717.

Please have the following information available:

1. Instrument model number (On front panel).
2. Instrument serial number (On rear panel).
3. Description of the problem.

If the instrument is to be returned Sacher Lasertechnik or Triad Technology, you will be given a Return Materials Authorization (RMA) number, which you should reference in your shipping documents as well as clearly marked on the outside of the shipping container.

Appendix

Stabilization Pictures

This appendix shows the peaklock in case of using a Doppler-free saturated absorption spectroscopy setup. The spectroscopic setup is shown in the last figure.

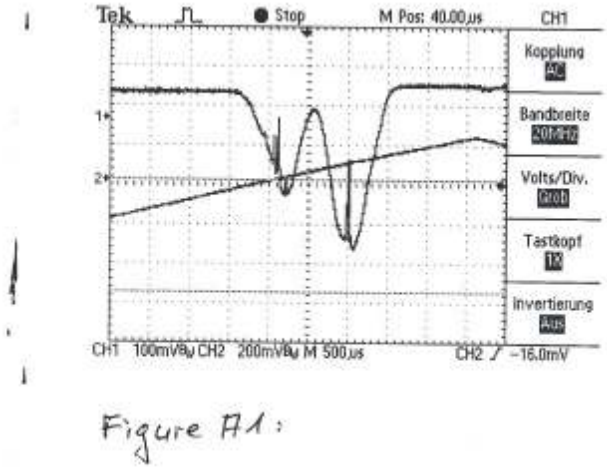


Figure 16 - Lamb dips of Rb

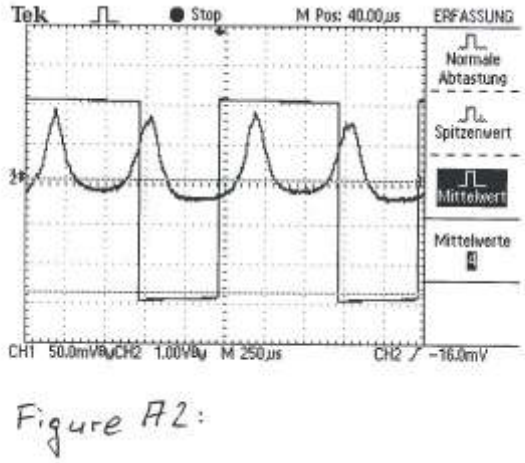


Figure 17 - Resolved Lamb Dip without Doppler background

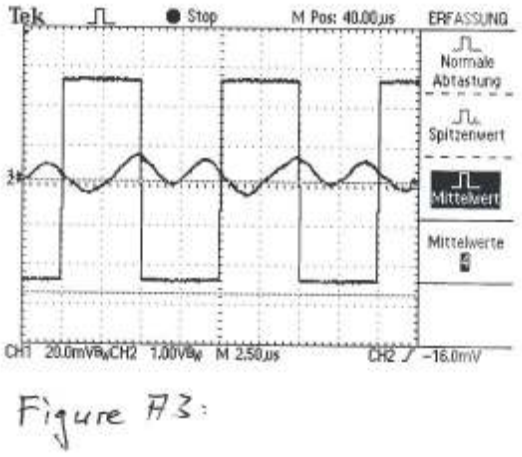


Figure 18 - Equivalent to fig 8.

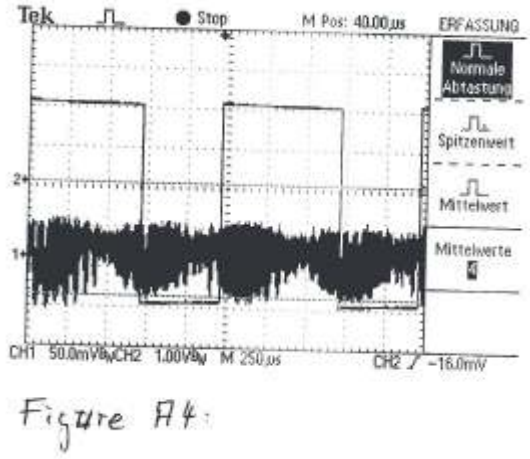


Figure 19 - Equivalent to fig. 14.

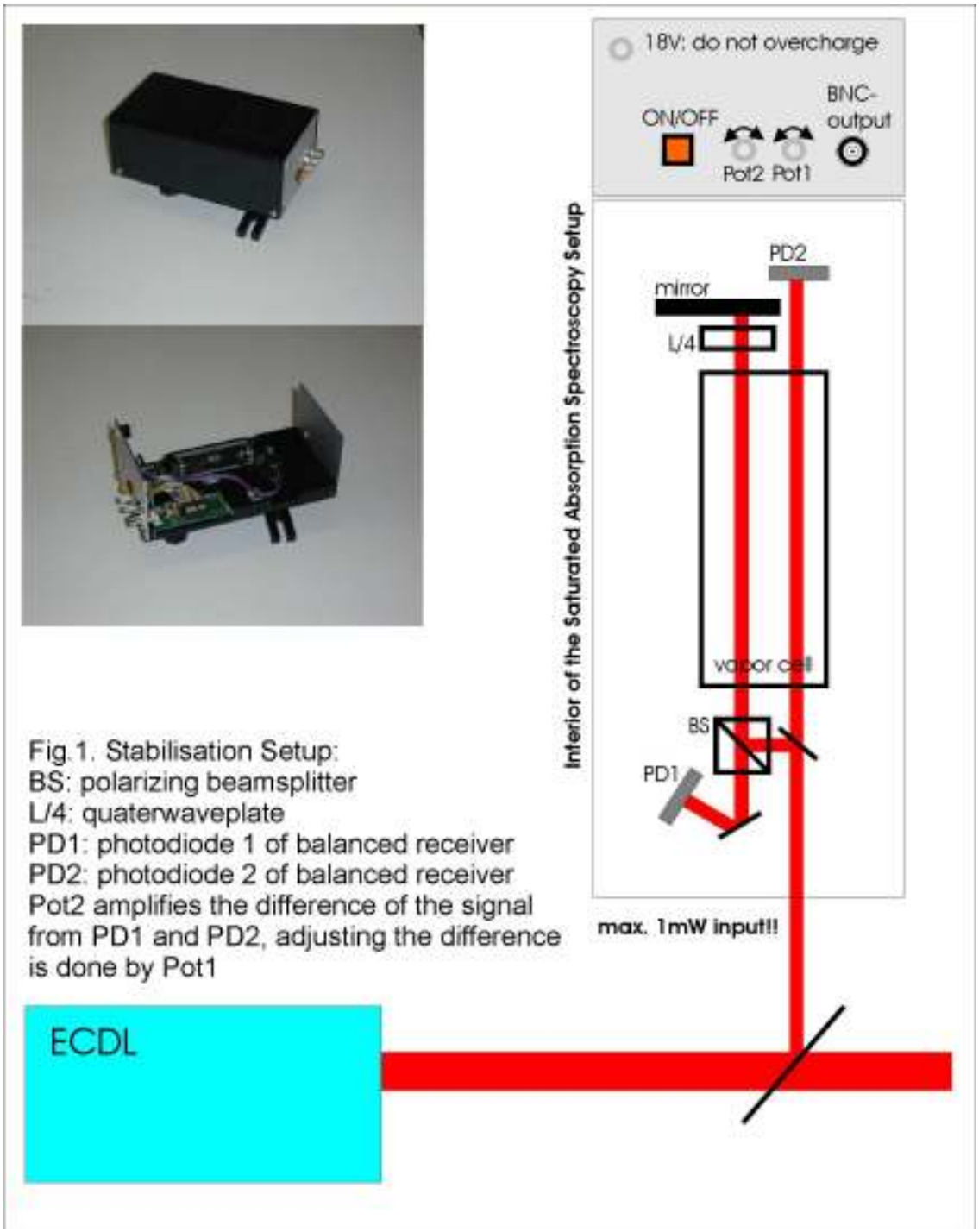
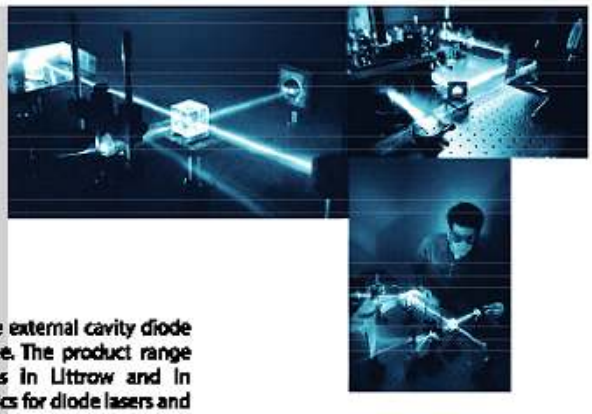


Figure 20 - Doppler-free saturated absorption spectroscopy setup

Note:
Batteries with a lifetime of several hours are included. You may use rechargeable batteries and charge them with the 18V connector if needed. There are no overcharge security, so DO NOT ACCIDENTLY OVERCHARGE. While measuring, the batteries must not be charged!

http://www.sacher-laser.com



Company Profile

Sacher Lasertechnik is leading manufacturer of tunable external cavity diode lasers (ECDLs) with more than 10 years of experience. The product range includes anti-reflection coated diode lasers, ECDLs in Littrow and in Littman/Metcalf configuration as well as driver electronics for diode lasers and sophisticated measuring electronics.

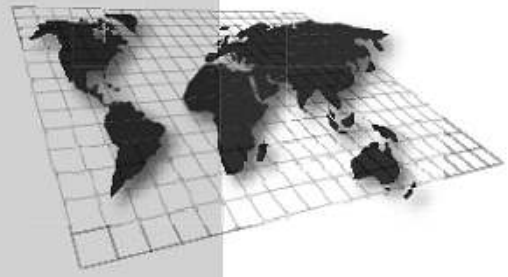
Sacher Lasertechnik was founded as a spin-off company of Marburg University in 1992. We started up with the manufacturing of anti-reflection coatings for diode lasers according to patent 6,297,066. Based on this key knowledge, we developed stable, narrow linewidth, wavelength tunable laser sources for spectroscopy, patent 5,867,512. We gratefully acknowledge the support of the German ministry of research within contracts 13N6693 and 13N7156.

Our product range currently covers

- Diode Lasers, Fabry Perot, DFB, Antireflection coated
- Tunable diode lasers in Littrow configuration
- Tunable diode lasers in Littman / Metcalf configuration
- High power (P>300mW) Raman lasers in Littrow configuration
- Low noise diode laser controllers
- Measurment electronics

Please contact us with your measurement requirements. We would be proud to support you with our competence.

Dr. Joachim R. Sacher



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